

## CHARACTERIZATION OF THE ICOSAHEDRAL PHASE OF $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ QUASICRYSTALLINE ALLOY

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**Abstract.** The present work aimed to characterize the microstructure of the icosahedral phase (quasicrystalline phase- $\phi$ ) of the system with stoichiometric composition of the quasicrystal  $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ . The ternary alloy with nominal composition of  $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$  was processed by mechanical alloying as a viable solid state processing method for producing various metastable and stable quasicrystalline phases. The structural characterization of the obtained samples was performed by X-ray diffraction and scanning electron microscopy, while the elemental composition was determined by dispersive energy spectroscopy. The diffraction patterns of  $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$  showed the presence of  $\beta$ -Al(Fe, Cu) and  $\lambda$ - $\text{Al}_{13}\text{Fe}_4$  phases that coexist with the thermodynamic quasicrystalline phase- $\phi$ . Finally, elemental analysis indicates that during alloy synthesis there is little variation of the ideal composition. The results indicate that alloys with high percentage of icosahedral phase can be obtained by casting in the air.

**Keywords:** icosahedral phase, characterization, quasicrystal  $\text{Al}_{63}\text{Cu}_{25}\text{Fe}_{12}$ .